

4.0 ALTERNATIVES CONSIDERED

4.1 Introduction

Major objectives of the study include providing needed capacity and safety within the study limits while maintaining access to businesses in the developed areas of Superior, Miami and Globe. Much of the traffic on US 60 is through traffic between the Phoenix metropolitan area and the recreational areas to the north and east. Bypassing the existing corridor is recognized as a likely result of improvement because of the extremely rough, mountainous terrain through the westerly section of the study area and the narrow corridor with historic buildings and current businesses located along the right of way through Miami and Globe. **Figure 4-1** shows some of the major obstacles for the corridor. In areas where terrain allows and impact on private property is tolerable the existing corridor will be considered for incorporation into the improved roadway either for one-direction of travel in the rural area or as part of a widened two-way roadway through developed areas.

Some of the alternatives utilize the existing roadway to some extent, typically using the existing roadway prism for one direction of travel. Much of the existing roadway will require either minor cross section adjustments (superelevation) or minor profile adjustments to meet design recommendations. Some of the existing roadway will require realignment to meet the desired design speed. Several alternative alignment concepts were considered for the design segments under consideration, with various combinations of roadway alignments and typical sections possible within each segment studied. This section of the report describes the development of the alternatives, provides an evaluation of the options, and presents recommendations on whether a particular alignment should be considered for further evaluation or discontinued.

Investigation of alternatives to bypass the extremely rugged terrain just east of Superior has led to the identification of alternatives that begin west of Superior near the Boyce Thompson Arboretum and bypass Superior with either one direction or two directions of traffic as defined hereafter under the descriptions of specific alternatives.

Between Florence Junction and Globe/Miami, there is no major roadway facility other than US 60. With no alternate, parallel routes available, both regional and local traffic must continue to use US 60 while the new

improvements are constructed. The highway must be designed to accommodate and achieve the following goals:

- Maintain at least two open lanes of traffic during construction.
- Minimize delays to regional traffic that passes through the area.
- Provide access to adjacent businesses and community developments.
- Provide capacity for future increased traffic resulting from both local and regional growth.

As described in Section 2, traffic projections, passing needs, and safety concerns indicate that US 60 should be widened to four lanes (two lanes in each direction) throughout the length of the study route. From a design, traffic, and construction standpoint, a divided roadway section, with two lanes in each direction, is desirable because it:

- Separates opposing traffic for increased safety.
- Allows retention of native vegetation in the median area and is more visually consistent with the character of the rural, mountainous area than a single, broad expanse of pavement.
- Incorporates independent alignments that permit adjustment of the roadway section to fit the landform thereby minimizing earthwork and the consequent impact upon the landscape in this designated scenic route.
- Allows use of the existing roadway for maintenance of traffic during construction of the improvement project.

An undivided roadway also may have advantages in and possibly adjacent to the Superior area and the Top of the World area where continued land development is likely adjacent to the corridor. For these instances, consideration must be given to:

- Maintaining continuous access to properties adjoining the roadway from either direction of travel.
- Minimizing the need for additional R/W from private properties.
- Minimizing the impact to (or loss of) business establishments.
- Desirability of an urban type roadway (curbs and sidewalks) in a developed (or developing) area.

- Minimizing construction costs by widening the existing roadway.
- Minimizing the impact on the adjacent landscape by limiting the width of roadway improvement.
- Providing left-turning movements onto intersecting streets and driveways to businesses and homes.

During the initial scoping, developing alternatives north of the Miami/Globe area was discouraged due to the abrupt topography, mining by the copper companies, and disturbances to existing private development. However, after requests from the Tonto National Forest, alternatives to the north have been incorporated into this feasibility study. Segment F includes these additional alternatives that were developed. As all alternatives recommended for further study will be evaluated further during the DCR, these alternatives may not be possible in the future as they do cross mining properties which could be significantly modified over time as the search for copper in this area expands.

For the purposes of this study, no new routes through the developed lands of Miami/Globe were considered as the public and agency scoping sessions suggested avoidance of private properties as a primary goal. However, with the development of alternatives into the virgin lands of the TNF south of Globe, the TNF has requested that a route be considered south of the forest boundary, north of existing US 60. While some cursory investigations have been made as part of this study, a more detailed evaluation will be needed during the development of the DCR through areas east of Top of the World.

Alternatives in the study segments described in the following subsections include a range of cross-sections from completely independent roadways to divided and undivided highways. The typical roadway sections used for this investigation follow the current (2000) standards obtained from the RDG, and are general in nature. It is understood that detailed typical roadway sections will be developed for future investigations as detailed mapping and specific routes are explored in greater detail.

4.2 Descriptions of Segments and Alternatives

The study area has been divided into six Segments for purposes of identifying and evaluating alternative alignments (see **Figure 4-2**).

- **Segment A** From approx. 0.7 miles west of Town of Superior west city limits (MP 224) to Devils Canyon (near MP 233). Segment A begins west of Superior because terrain just east of Superior is so steep and rugged that alternatives to the existing alignment that begin east of Superior are not available. It is necessary to begin west of Superior to identify alternative vertical and horizontal alignments that can be achieved within ADOT design guidelines.
- **Segment B** From Devils Canyon to east of the Pinal/Gila County line (MP 236).
- **Segment C** From east of Pinal/Gila County line to east of Pinto Valley Road (MP 240)
- **Segment D** From East of Pinto Valley Road (MP 240) to “The Gap,” approx. 2 miles west of SR 77, south of Globe
- **Segment E** From “The Gap” to Jct. US 60/SR 77 near US 60 MP 254 northeast of Globe.
- **Segment F** Alternatives considered north of Miami/Globe that mirror Segments E and F, south of US 60.

In the following text, an overview of the existing conditions for each segment is provided in the segment description. Following each segment overview is a detailed description of each of the alignment alternatives considered within that corridor. Each alternative has been developed based on the project objectives and using the design controls listed in Section 5.2.

4.2.1 No Build Alternative:

The No-Build Alternative is provided for comparison purposes and provides no improvements to the existing roadway section. It involves no cost and no apparent change to the environmental features of the US 60 corridor.

4.2.2 Segment A (Boyce Thompson Arboretum to Devils Canyon):

Segment A begins west of the city limits of Superior at Station 1693+79 (approx. MP 223.8) of Alternative D-2 of the Florence Jct. to Superior DCR, currently being completed by ADOT (see **Figure 4-3**). It extends easterly to the top of Queen Creek Canyon, and ends just east of Devils Canyon near MP 233. Part of the DCR Segment D and all of Segment E of the Florence Junction to Superior DCR are included in Segment A. Alternatives that begin at Station 1693+79 match into Alternative D-2 since that is the recommended alternative in the Florence Jct. to Superior DCR. One alternative in this study begins at the end of the Florence Jct. to Superior DCR and matches Alternative E-1 with modifications as described in the text for that Alternative.

All of the alternatives for Segment A assume that the improvements described for Segment E-1 in the Florence Jct. to Superior DCR will be completed. These improvements will provide a five lane section through Superior.

Alignments considered in Segment A include:

- Split alignments with westbound traffic bypassing Superior to the north, following Silver King Wash northerly, then turning east and climbing to the top of Queen Creek Canyon and continuing easterly over Devils Canyon. Eastbound traffic will follow the existing US 60 roadway which will be upgraded to current standards.
- Divided roadway alignments with both directions of traffic bypassing Superior to the north up Silver King Wash, then climbing to the top of Queen Creek Canyon and easterly over Devils Canyon.
- A divided roadway alignment that follows Silver King Wash northerly and circles around Peachville Mountain to a summit near Fortuna Peak, then easterly to Devils Canyon.
- An alignment that begins at the Jct. of US 60 and SR 177 (MP 226.85) which is the end of Alternative E-1 of the Florence Jct. to Superior DCR. It then follows the existing alignment of US 60 easterly to MP 230. From MP 230 easterly to the end of Segment A, the alignment is a divided roadway with the westbound alignment north of existing US 60 and eastbound traffic following existing US 60 through Devils Canyon.

Existing US 60 is a two-lane, 40-foot wide rural highway from the beginning of the segment (MP 223.8) to the Queen Creek Bridge at MP 226.1. Left turn lanes have been provided at the intersections of the landfill access road, Mary Drive and Main Street. From the Queen Creek Bridge east, US 60 is an urban 55-foot wide roadway section with two through lanes, continuous left turn lane and two 8-foot wide curb-side parallel parking lanes. There are about 43 existing turnouts, driveways and street intersections along US 60 through Superior. The accident rate through Superior is about 1.5 to 2 times more than the State average. US 60 is designated as a Scenic Highway through this Segment of the study.

The Magma Arizona Railroad is located west and north of US 60 at the beginning of this segment. Ownership of adjacent property west of Superior includes Pinal County, Tonto National Forest and private property. Through Superior, most of the adjacent property is privately owned. East of Superior adjacent property is mixed private ownership and Tonto National Forest land. There has been significant mining activity in the areas surrounding Superior. Detailed development of any of the alternatives other than the existing roadway will require investigation of underground mining activity and the possible effect on roadway foundations.

East of Superior, US 60 enters mountainous terrain with a basic two-lane, 40-foot wide rural roadway that has been restriped to provide a eastbound climbing lane through much of the rest of this segment.

There are seven bridges and one tunnel along US 60 within this segment:

- A 2-span concrete slab bridge crosses a minor wash at MP 224.64 (Str. No. 319).
- A 4-span concrete slab bridge crosses Queen Creek at MP 226.14 (Str. No. 436).
- A 3-span concrete slab bridge overpasses Stone Avenue at MP 226.62 (Str. No. 437).
- US 60 crosses under SR 177, which is on a 3-span concrete slab bridge at MP 226.85 (Str. No. 438).
- A steel arch bridge crosses Queen Creek at MP 227.71 (Str. No. 406).
- US 60 passes through a 1150 foot tunnel at MP 228.47 (Str. No. 407).
- A concrete T beam bridge crosses Waterfall Canyon at MP 229.5 (Str. No. 328)
- A concrete frame bridge crosses Devils Canyon at MP 232.49 (Str. No. 261)

The main drainage flow pattern in this segment is north to south. West of approx. MP 232, drainage flows to Queen Creek, which flows generally east to west. East of MP 232, drainage flows to Devils Canyon, which flows generally north to south.

There are numerous utilities within this segment of US 60. Utility companies include Arizona Water Co., Southwest Gas, El Paso Natural Gas, Arizona Public Service Co., SRP, Quest Communications, Eagle West Cable TV and Superior Sanitary District.

Perhaps the largest influence within this segment is the mining operations of the Resolution Copper Company. While operations are dormant at this time, plans to begin new mining operations in 2020 could impact the development of some alternatives. The main shaft of the mining operation is located at the existing shaft headworks at the east end of the Queen Creek Canyon, south of Oak Flats. This shaft extends nearly 7500 feet down to the oar bodies. Tailings from this operation could be stockpiled on the lands south of the highway and shaft headworks, east of the Canyon, or brought through an existing underground tunnel that connects with the Superior area and hauled to other mining operation sites for processing. This horizontal tunnel is located generally parallel to and 300-ft beneath the existing highway.

The existing highway and Queen Creek tunnel for US 60 is located on the private land owned by the copper company, within a line of sight easement. The easement allows the highway to exist, but does not make the copper company responsible for any subsidence or differential settlement issues associated with mining operations. While the copper company does not wish to stop the traffic on this highway, they were concerned with what is proposed in the future on the highway, as any widening would require additional easement from the company. The company is also considering enhancements to the corridor and community that would add to the use of the corridor. Such improvements may include developing a nature trail along the original highway alignment, or making other pathways and scenic opportunities available within the canyon. Enhancements could also be made in association with the Arizona Trail located on the west side of the Arboretum. Details of these improvements are very preliminary, and will be developed with input and involvement with both the local communities and government agencies.

Alternative A-1: Alternative A-1 consists of constructing a new westbound 2-lane roadway north of Superior from just east of the Boyce Thompson Arboretum to the top of Queen Creek Canyon (MP 230) (See **Figure 4-3** and the Alternative A-1 plans in the **Appendix**). East of Queen Creek Canyon, the new westbound roadway will be located north and west of the existing US 60 highway at Oak Flat and in Devils Canyon. Two lanes of eastbound traffic will follow the existing US 60 alignment through Superior, across the existing Queen Creek bridge, through the existing Queen Creek tunnel, across the existing Devils Canyon bridge to the end of Segment A near MP 233.

The alternative begins at Station 1693+79 (approx. MP 223.8) of alternative D-2 of the Florence Junction to Superior Design Concept Report (DCR), which is being completed by ADOT. Alternative D-2 consists of a 4-lane divided highway with both the eastbound and westbound roadways located north of the existing US 60 roadway.

Since eastbound traffic would be passing through Superior it would have direct local access to businesses and residences; however, westbound traffic would bypass Superior and would be separated from the existing street system by very rugged terrain. The following routing options were identified and analyzed to determine if access to Superior is feasible with the split alignment.

Options 1 and 2 address westbound traffic entering Superior, options 3 and 4 address westbound traffic leaving Superior, and option 5 addresses westbound traffic both entering and leaving Superior.

- **Option 1, Westbound Local Traffic Entering Superior Would Use The Existing US 60 Roadway:** Westbound traffic entering Superior would exit US 60 east of Superior near MP 230 and would occupy one lane of the existing roadway westerly into Superior. Eastbound traffic will also be using existing US 60 and will require two lanes throughout this Segment.

Although existing US 60 in this area is currently functioning as a three-lane roadway through much of its length, the roadway section, including the Queen Creek tunnel uses a 40-foot 2-lane width that is striped for three lanes. The existing Queen Creek bridge is 30 feet wide and can accommodate only two lanes. Bringing the existing section to current standards for a three lane roadway would require widening the entire roadway section from Superior to MP 230, including the existing Queen Creek bridge and the existing Queen Creek tunnel.

The widening would require extensive construction through extremely rough terrain, would adversely impact Queen Creek and would require extensive reconstruction of two major structures while serving a fairly small amount of traffic. Therefore, use of existing US 60 for local access for westbound traffic is not feasible.

- **Option 2, Westbound Local Traffic Entering Would Use An At-grade Intersection Near The Boyce Thompson Arboretum:** Westbound traffic wishing to enter Superior from the east would stay on the new westbound US 60 roadway bypassing Superior to an at-grade intersection near the Boyce Thompson Arboretum (near MP 222.6) west of Superior. They would then make a U-turn on US 60 and head east on US 60 to enter Superior.

Since this movement requires a U-turn on a major high-speed highway and routes westbound traffic going to Superior out of direction by approximately four miles, it is not likely it would be used. If it were used by a significant number of drivers it would introduce conflicting traffic movements that are, at best, undesirable, and at worst, unsafe. Therefore, this option is not acceptable.

- **Option 3, Provide A New Access Road Near The Eastbound Ramp Into Superior For Westbound Local Traffic:** A westbound on-ramp would be constructed from existing US 60 leaving Superior, to intersect the new westbound US 60 roadway near MP 224. This would provide a complementary movement to the eastbound traffic entering Superior. Westbound traffic on US 60 would not be able to exit US 60 at this location.

At this location the new westbound roadway is elevated to cross over the Magma Arizona Railroad. The westbound on ramp from existing US 60 would have to cross the Magma Arizona Railroad at-grade, then climb to intersect the elevated westbound roadway. It is not possible to achieve this elevation difference near the existing US 60 alignment. Option 5 discusses an at-grade intersection further north.

Option 4, Route Local Traffic Leaving Superior Westerly Along Existing US 60 To The Boyce Thompson Intersection: Local westbound traffic would have to be routed across the new eastbound US 60 half of the split roadway couplet that uses existing US 60 through Superior. Providing acceptable geometric alignment for such a crossing would require additional right-of-way on both sides of existing US 60 near MP 224; would impact the Magma Arizona

Railroad, and would require undesirable alignment for the westbound local roadway. Therefore, this option is not acceptable.

- **Option 5, Provide A New Access Road Between US 60 And Superior For Westbound Local Traffic:** Route westbound traffic into Superior via a new local access road that would intersect the new westbound US 60 north of Superior at approximate MP 224.8 and head south into Superior, connecting with existing US 60. This access road would serve both westbound traffic entering Superior and westbound traffic leaving Superior.

Locating the local access road near MP 224.8 would place it in moderate terrain. Since the local access road would tie into westbound US 60 it would only accommodate east to west inbound and outbound traffic which may be confusing and inconvenient for occasional users who would expect to be able to use the road they came into Superior on for their return trip. Approximately 0.5 miles of new right of way would be required, a drainage wash would be crossed, and the Magma Arizona Railroad would be crossed with an at-grade crossing.

Because the new access road would require new right of way and a railroad grade crossing and since it would tie into a one-directional main roadway, this option is not desirable

As outlined above, all of the options identified to resolve the issues associated with providing local access to Superior for westbound traffic have significant shortcomings. In addition, it is questionable that a split roadway with one direction bypassing Superior and the other passing through Superior using the existing two-way roadway would provide acceptable service to either the local community or to through traffic. Therefore Alternative A-1 will be dropped from further consideration and will not be developed further.

Alternative A-2: Alternative A-2 consists of constructing a new 4-lane divided highway on new alignment from just east of Boyce Thompson Arboretum, extending approximately five miles north of the existing highway, bypassing Superior, and ending north of existing US 60 at Devils Canyon.

Alternative A-2 begins at Station 1693+79 (approx. MP 223.8) within Alternative D-2 of the Florence Junction to Superior DCR. Local traffic entering and leaving Superior from the west will access the new highway from existing US 60 west of the beginning of this study via an at-grade intersection located near the Boyce Thompson Arboretum near

MP 222.6. Local traffic entering and leaving Superior from the east will access the new highway from a connecting road between new US 60 and existing US 60 located in Segment B. Existing US 60 becomes a business route providing access to Superior and SR 177.

The new 4-lane divided highway will have a minimum 108-foot separation between the eastbound and westbound roadways. The alignment crosses Silver King Wash and the Magma Arizona Railroad and follows the west side of the Silver King Wash in a northeasterly direction, continuing northerly for approximately five miles climbing at a rate of 6 percent. It then turns easterly and continues climbing at a 6 percent grade, circles around Peachville Mountain to a summit near Fortuna Peak (see **Figure 4-3**). The alignment then follows Queen Creek in a southeasterly direction for approximately two miles, and then turns easterly to Devils Canyon. It crosses Devils Canyon with a 900-foot eastbound bridge and an 800-foot westbound bridge, near the end of segment A.

Between Superior and Top of the World (near MP 235) existing US 60 will be retained to provide local access for traffic to and from Superior from the east. Access to new US 60 will be via an at-grade intersection located near MP 235 and a connecting roadway between new and existing US 60. There is an existing local road at this location that would have to be improved to provide satisfactory service.

Issues to be addressed for alternative A-2 include:

- Large cuts and fills through mountainous areas will be a significant cost factor in comparison with other alternatives.
- Bypassing Superior may adversely impact businesses in Superior.
- Local access to Superior from the west will be through a grade intersection located approximately 1.5 miles west of town. The public should be given the opportunity to comment on the acceptability of this access.
- Will the bypass of Superior reduce traffic accidents compared to alternatives that maintain US 60 traffic through Superior?

Details of this alternative are shown in the plan sheets in the **Appendix**, including preliminary vertical profiles.

Alternative A-3: Alternative A-3 consists of improving US 60 from Superior to Devils Canyon by providing 2-lanes of through traffic in each direction. The existing alignment is used throughout the alternative, however the roadway improvement sections vary depending on the location within the segment.

Alternative A-3 begins at approximately Station 1845+00 (MP 226.7) at the eastern edge of Superior just west of the junction with SR 177 (see **Figure 4-3**). The roadway section will be 4-lanes with a 16 foot median and concrete barrier. This section will extend under the SR 177 underpass. The existing SR 177 bridge and the interchange ramps will have to be reconstructed to accommodate the widened US 60 roadway. The 4-lane with median barrier section will follow the existing alignment for approximately 0.7 miles east of SR 177, which will minimize the width of the roadway and reduce the cut on the south side of the existing roadway. The widening will be constructed on the south side of the existing roadway to stay out of Queen Creek. At approximately Station 1894+00 the 4-lane with median barrier section will transition to a divided highway section with the westbound traffic using the existing US 60 alignment. A new eastbound roadway will be constructed to the south and east of the existing roadway. A new 800-foot bridge will be required over Queen Creek for the eastbound roadway.

East of the Queen Creek bridges, the terrain is extremely steep. Queen Creek is located immediately south of existing US 60 approximately 300 feet below the existing grade and the slope rises approximately 1,000 feet above the roadway at a slope of approximately 0.8:1. Existing US 60 passes through the most severe section of this mountain with a 1,200-foot long tunnel. From the east end of the tunnel similarly steep slopes extend to the east for approximately one mile with existing US 60 terraced into the slope. Two sub-alternatives (A-3a and A-3b) have been identified for a 4-lane roadway through this extremely steep area.

West of the existing tunnel the alignment of Alternative A-3a transitions to the north with the eastbound roadway following existing US 60 through the Queen Creek tunnel and the westbound alignment north of existing US 60. A new 1400-foot tunnel will be required for the westbound roadway parallel to existing US 60. East of the Queen Creek tunnels near MP 229 the westbound lanes transition to a viaduct section located above the eastbound roadway on the existing alignment. The viaduct section continues to approximate MP 230, where Alternatives A-3a and A-3b merge.

The alignment of Alternative A-3b continues with the westbound lanes on the existing roadway through the existing Queen Creek tunnel. The new eastbound roadway will be located south of the existing roadway with a new 1075-foot tunnel parallel to existing US 60. East of the Queen Creek tunnels the eastbound and westbound divided roadways transition to a 4-lane section with a 16-foot median and concrete barrier. This section will continue to approximate MP 230, where Alternatives A-3a and A-3b merge and the Alternative designation again becomes A-3.

From MP 230 the roadway section transitions to a divided highway with the eastbound traffic following the existing US 60 roadway and the westbound alignment parallel to and 108-feet north of existing US 60 through Oak Flat to MP 231. At MP 231 the westbound roadway departs from existing alignment and turns to the north following moderate alignment north of the steep terrain through Devils Canyon to Iron Canyon and the end of Segment A. The eastbound roadway stays on existing alignment and follows existing US 60 to the end of Segment A.

A median crossing with grade intersections both left and right is planned at FR 469 (MP 231) to provide access to the Magma Mine property on the south side of US 60 and to Tonto National Forest Land on the north side.

Issues to be addressed for Alternative A-3 include:

- SR 177 underpass structure and interchange ramps will have to be reconstructed. The local connector road between Lobb Ave. and SR 177 will also have to be moved further to the south. Reconstruction of the SR 177 underpass structure east of the existing location and minor realignment of SR 177 to the south and the local street to the north should be considered to allow traffic to be maintained during construction and to improve the alignment of the local street.
- Maintenance of traffic during construction – there are no alternate routes; therefore traffic must be maintained on the existing highway during construction.
- Existing US 60 will have to be upgraded to current standards where it is used for one direction of traffic.
- Impact on Queen Creek if fills/retaining walls encroach.
- Retain truck escape ramp west of the Queen Creek tunnel.

Details of this alternative are shown in the plan sheets in the **Appendix**, including preliminary vertical profiles.

Alternative A-4: Alternative A-4 consists of constructing a new 4-lane divided highway that extends approximately two miles north of the existing highway, bypassing Superior, from just east of Boyce Thompson Arboretum to Devils Canyon.

Alternative A-4 begins at Station 1693+79 (approx. MP 223.8), matching Alternative D-2 of the Florence Junction to Superior DCR. Access to and from Superior from the west will be through an at-grade intersection located west of the beginning of this study near the Boyce Thompson Arboretum (MP 222.6). Access to and from Superior from the east will be through an at-grade intersection and connection to existing US 60 near MP 230.3. Existing US 60 becomes a business route providing access to Superior and SR 177.

The new 4-lane divided highway will have a minimum 108-foot separation between the eastbound and westbound roadways. The alignment crosses over Silver King Wash and the Magma Arizona Railroad on structure and follows the east side of the Silver King Wash in a northeasterly direction for approximately two miles. The eastbound roadway then turns east and begins climbing at a 6% grade, traversing the south side of steep slopes towards the top of Queen Creek Canyon. The westbound roadway continues to follow Silver King Wash in a northeasterly direction for approximately another 1.5 miles where it loops back to the southeast, traversing the north side of steep slopes at a 5%-6% grade, and also heads towards the top of Queen Creek Canyon. Silver King Road (FR 229) is connected to the new roadway by a grade intersection and a median crossing roadway near Station 1860+00. Tunnels are required for both directions of travel; a 2,150-foot tunnel for the eastbound roadway and a 3,200-foot tunnel for the westbound roadway. Both directional roadways traverse mountainous terrain that contains the remains of numerous mines.

Near the top of Queen Creek Canyon (MP 230.5) the eastbound roadway joins existing US 60 alignment, with the westbound roadway parallel to and 108-feet north of the existing road. Just east of MP 231 both eastbound and westbound roadways depart from the existing alignment and proceed as parallel roadways west of the existing road, following moderate terrain west of the extremely steep terrain through Devils Canyon. Near MP 233 the parallel roadways again turn to the east and cross Devils Canyon, requiring two new bridges. Alternative 4 ends just east of Devils Canyon.

Local road intersections are planned at Magma Mine Road (FR 469) (MP 231) to provide access the Oak Flats area and Forest Service Land, and at MP 231.4 to provide local access to existing US 60.

Issues to be addressed for Alternative A-4 include:

- Two long tunnels are required. Consider cost, traffic control, ventilation, lighting and safety measures.
- Cut/fill slopes in areas where alignment is traversing steep mountainous terrain are visible from Superior and may have a visual impact.
- Bypassing Superior may adversely impact businesses in Superior.
- Local access to Superior from the west will be through a grade intersection located approximately 1.5 miles west of town. The public should be given the opportunity to comment on the acceptability of this access.
- Will the bypass of Superior reduce traffic accidents compared to alternatives that maintain US 60 traffic through Superior?
- Possibility of encountering mining claims and old mine shafts – both as a right of way issue and a roadway foundation issue.

Details of this alternative are shown in the plan sheets in the **Appendix**, including preliminary vertical profiles.

4.2.3 Segment B (Devils Canyon to Pinal/Gila County Line):

Segment B begins at the eastern limits of Segment A (approx. MP 233) which is at the east end of the Devils Canyon Bridges and extends 3.35 miles to end just east of the Pinal/Gila County Line near MP 236.5 (See **Figure 4-4**). Segment B contains the Top of the World residential community.

Alignments considered in Segment B include:

- A split alignment with westbound traffic passing to the north of Top of the World and eastbound traffic using the existing alignment through Top of the World.
- A divided alignment that passes north of Top of the World with both directions of travel.
- An alignment that is divided with westbound traffic north of existing US 60 to MP 234.2 where it converges with eastbound traffic using the existing alignment. From MP 234.2 easterly the alternative becomes a five-lane, two direction roadway following the existing alignment through Top of the World, and then diverging to become a divided highway at the end of Segment B.

Alignments that bypass Top of the World far enough to the north or south to remove through traffic completely from the Top of the World community were investigated but were rejected. Moving far enough to the north or south to avoid noise or visual awareness of the traffic would require constructing through severe terrain that would raise the cost and make it much more difficult to achieve current design standards. However, alignments have been identified that are located north of Signal Mountain and will separate much of the community from the new roadway. Those alignments are included in the study.

Existing US 60 through this segment is typically a 2-lane 40-foot wide rural highway. An eastbound climbing lane was added by re-stripping the existing 40-foot wide section from the beginning of the Segment to MP 234.32. The existing alignment in this segment has 11 horizontal curves and profile grades vary from 0.0% to 6%. The accident rate in this segment of US 60 is substantially above the State average with the Top of the World area being almost triple the State average. US 60 is designated as a Scenic Route through this Segment.

There are twelve existing turnouts on the south side of US 60 and seven on the north side. Most of the turnouts are through the Top of the World area and some of them serve more than one property. There are two

defined intersections, both on the south side of US 60 near the east end of the Segment.

Ownership of adjacent property along existing US 60 includes Tonto National Forest and private property. Ownership of property north of existing US 60, where alternative alignments are located is predominantly Tonto National Forest.

There are no bridge structures located within Segment B.

Drainage flow in Segment B is generally westerly towards Devils Canyon, which runs north and south with drainage flowing to the south through Devils Canyon and under existing US 60. There are no major drainage structures located in this Segment. Several culverts cross under existing US 60.

Two 115 KV SRP transmission lines run generally east and west through Segment B. One crosses existing US 60 at approximate MP 234.7 and converges with the other north of existing US 60 near MP 234.8 and the two lines continue easterly on a common alignment through the Segment north of existing US 60. Existing APS distribution power lines and Quest telephone lines are located parallel to existing US 60 through the Top of the World community.

Alternative B-1: Alternative B-1 consists of constructing a new westbound 2-lane roadway north of the existing US 60 from Devils Canyon to just east of the Pinal/ Gila County line. Eastbound traffic will follow the existing roadway through Iron Canyon and the Top of the World area. Alternative B-1 matches Alternative A-3 from Segment A.

The new westbound roadway begins at the east approach to the new westbound Devils Canyon Bridge. The alignment continues in an easterly direction, keeping to the north side of Signal Mountain and stays north of the residential development in the Top of the World area and the 115 KV SRP transmission towers. It is located primarily on Tonto National Forest land. East of the county line, the new westbound roadway curves into the existing US 60 alignment, approaching the end of Segment B.

Alternative B-1 eastbound begins on the existing US 60 alignment near MP 233 matching the eastbound A-3 alignment near where Devils Canyon and Iron Canyon separate. The eastbound 2-lane roadway will follow existing US 60 alignment to approximate MP 234.5. From that location easterly the roadway section will have to be widened to include at least one westbound lane to provide local access to properties in the

Top of the World area. A connector roadway will be located near MP 234.5 to connect the new westbound roadway to the two-way roadway to provide local access. The 3-lane, 2-way roadway will extend easterly through the Top of the World area to approximately the county line. A westbound connector ramp will connect from the new westbound roadway to the westbound access lane on the 3-lane section.

Issues to be addressed for Alternative B-1 include:

- The new westbound roadway can be constructed while traffic remains on the existing roadway. The through 2-way traffic can then be shifted to the new westbound roadway while improvements are made to the existing US 60.
- Existing US 60 will have to be reconstructed to meet current ADOT Design Guidelines.
- Where the 3-lane section is provided for access the design will have to preclude opportunities for wrong-way movements, particularly at the west end of the section where the two-way section begins.
- Access to properties in the Top of the World area will conflict with through traffic. Consideration should be given during further study, to providing a continuous turn lane through this area, which would result in a four lane section with 2-lanes eastbound, 1 westbound access lane, and 1 continuous turning lane.

Details of this alternative are shown in the plan sheets in the **Appendix**, including preliminary vertical profiles.

Alternative B-2: Alternative B-2 consists of constructing a new 4-lane divided highway from the new Devils Canyon bridges to just east of the Pinal/Gila County line. Alternative B-2 will match Alternatives A-2 and A-4 from Segment A.

The alignment of Alternative B-2 is similar to Alternative B-1 westbound; the alignment keeps to the north side of Signal Mountain and stays north of the residential development in the Top of the World area and the 115 KV SRP transmission towers. It is located primarily on Tonto National Forest land. Existing US 60 will be retained to provide access to properties through the Top of the World area. A connector road between the new highway and existing US 60 will be provided at the west end of Top of the World near MP 234.7. At the east end of Top of the World, existing US 60 will be modified where it crosses the new alignment to provide a cross road intersection between existing US 60 and the new roadway (see **Figure 4-4** and the plans/profiles in the **Appendix**).

Issues to be addressed for alternative B-2 include:

- Existing US 60 can remain in service during construction of the new roadways.
- The existing community will be bypassed. This may be desirable for residents but may be undesirable for any present or future business activities.

Alternative B-3: The third option within this segment, Alternative B-3 consists of improving US 60 from Devils Canyon to just east of the Pinal/Gila County line by providing 2-lanes of through traffic in each direction, making maximum use of the existing US 60 alignment. Alternative B-3 matches Alternative A-3 in Segment A. The roadway sections will vary through the Segment as described below.

The westbound roadway begins at the east approach to the new westbound Devils Canyon Bridge (see **Figure 4-4**). The alignment continues due east and joins the eastbound roadway near MP 234.2. The eastbound roadway follows existing US 60 alignment from the beginning of Segment B to MP 234.2. At that point the roadway section transitions from a divided highway to a new 5-lane section that will follow existing US 60 through the Top of the World area to approximately the county line. The 5-lane section will then transition back into a divided highway at the end of Segment B

Issues to be addressed for Alternative B-3 include:

- Existing US 60 will have to remain in service during construction. There are no detour routes available.
- Existing US 60 will have to be reconstructed to meet current ADOT Design Guidelines for both a 2-lane, 1-way roadway on the west end of the Segment and a 5-lane roadway section through the majority of the Segment.
- Existing utility lines along both sides of the existing roadway may be in conflict with the widened roadway section.

Details of this alternative are shown in the plan sheets in the **Appendix**, including preliminary vertical profiles.

4.2.4 Segment C (Pinal/Gila County Line to MP 240):

Segment C begins as a continuation of Segment B (MP 236.5), at the east end of the Top of the World area and extends 3.5 miles to MP 240 approximately 0.6 miles east of the intersection with Pinto Valley Road (see **Figure 4-5**).

Alignments considered in Segment C include:

- A divided alignment with westbound traffic following existing US 60 and eastbound traffic on a new alignment south of existing US 60
- A divided alignment with both directions of traffic on new alignments south of existing US 60.

Alignments north of existing US 60 were not considered because terrain north of the existing highway is quite steep which would require large cuts and fills. Alignments to the north would also be longer than those to the south. Construction costs to the north would be substantially higher than alignments south of existing US 60.

Existing US 60 is typically a 2-lane 40-foot wide rural highway. Westbound climbing lanes have been added by re-striping the existing 40-foot wide section from MP 236.3 to MP 238.2 and from 239.5 to MP 240.9 beyond the end of Segment C. The existing alignment in this segment has 17 horizontal curves and profile grades that vary from 0.375% to 6.076%. The accident rate in this Segment of US 60 is substantially above the State average with the Pinto Creek area being almost triple the State average. US 60 is a scenic corridor the entire length of Segment C.

There is one existing turnout along US 60 located at approx. MP 239.9, serving a cemetery on the south side of US 60. A channelized intersection for Pinto Valley Road is located at MP 239.3, and a non-channelized intersection is located at MP 239.5.

Property throughout Segment C is owned by the Tonto National Forest except for private parcels on the alternative alignments west of Pinto Creek and private parcels on both sides of existing US 60 near MP 239.9.

There is one bridge along US 60 in this Segment. It is a steel arch structure crossing Pinto Creek at MP 238.25 (Str. No. 351).

Drainage flow from the beginning of this Segment to approx. MP 238 is generally to the east towards Pinto Creek and from MP 238 to approx. MP 239, it is generally to the west towards Pinto Creek. Pinto Creek

flows northwesterly, crossing US 60 at MP 238.25. Drainage flow from approx. MP 239 to the end of Segment C at MP 240 is generally to the north east towards Copper Springs Canyon. Major drainage structures located in the Segment are a reinforced concrete box culvert located at MP 236.95 and the Pinto Creek bridge located at MP 238.25.

Two 115 KV SRP lines run generally east and west through Segment C crossing existing US 60 near MP 236.5. A Quest telephone line crosses US 60 near MP 239. There does not appear to be any other utilities within this Segment.

Alternative C-1: Alternative C-1 begins at the end of Segment B and matches Alternatives B-1 and B-2. Alternative C-1 consists of constructing a new eastbound 2-lane roadway south of existing US 60 from the Pinal/Gila County line to the end of Segment C at approximately MP 240. The eastbound alignment heads due east following the general route that the old original highway followed. The alignment then angles northeasterly, gradually approaching the alignment of existing US 60 near MP 239, and then swings to the south of the existing road.

The westbound roadway will follow existing US 60 alignment from the beginning of Segment C across the existing Pinto Creek bridge to the vicinity of Pinto Valley Road. At that location it will leave the existing US 60 alignment and head in a southeasterly direction to the end of the segment.

Both eastbound and westbound roadways swing to the south of the existing road and head due east as described for Segment D.

A new 1200-foot bridge will be required over Pinto Creek for the new eastbound roadway. At Pinto Creek the new eastbound roadway will be approx. 0.5 miles south of the westbound roadway on existing US 60 alignment.

A connector road between the westbound and eastbound roadways will be provided at the Pinto Valley Road intersection.

Issues to be addressed for Alternative C-1 include:

- The new eastbound roadway can be constructed first while traffic is maintained on the existing US 60. Two-way traffic can then be moved to the new roadway while the existing US 60 roadway is modified.
- Existing US 60 will have to be upgraded to meet current ADOT Design Guidelines.

- Access will have to be maintained to crossroads and the cemetery.

Details of this alternative are shown in the plan sheets in the **Appendix**, including preliminary vertical profiles.

Alternative C-2: The second alternative within this segment is Alternative C-2, which consists of constructing a new 4-lane divided highway south of existing US 60 from the end of Segment B near the Pinal/Gila County line to the end of Segment C at approximately MP 240. The alignments of both roadways will head due east at the end of Segment C. Alternative C-2 will match Alternative B-2 for Segment B.

The new eastbound roadway for Alternative C-2 will be the same as the Alternative C-1 eastbound roadway described above. The new westbound roadway will generally be parallel to the eastbound roadway. Alternative C-2 will require two new bridges over Pinto Creek. The eastbound bridge will be approximately 1200 feet long and the westbound bridge will be 1075 feet long.

An at-grade intersection with a connector road to existing US 60 will be located at the Pinto Valley Road intersection to maintain local access. Another access point to the existing US 60 and the Globe/Miami area will be provided east of Segment C near Copper Springs Canyon, which will serve as a business route into the Globe/Miami area.

Issues to be addressed for alternative C-2 include:

- Traffic can be maintained on existing US 60 while the new roadways are being constructed.
- Access will have to be maintained to crossroads during construction.

Details of this alternative are shown in the plan sheets in the **Appendix**, including preliminary vertical profiles.

Segment D (MP 240 to “The Gap”):

Segment D continues from the end of Segment C (MP 240) approximately 0.6 miles east of Pinto Valley Road and extends easterly, ending south of Globe at “The Gap” (the term provided by local residents for an area bounded by several canyons located approximately 2 miles west of SR 77, and 4 miles south of existing US 60) (see **Figure 4-6**).

Existing US 60 from MP 240 to MP 243.6 is typically a 2-lane 40-foot wide section. A westbound climbing lane has been added by re-striping the existing 40-foot wide section from MP 239.6 to MP 240.9. This 2-lane section has 14 horizontal curves and grades ranging from 0.0% to 6.0%.

Through the main section of Miami, MP 243.6 to MP 244.7, US 60 is a 64 foot wide section with 2-lanes in each direction and parking on each side. Many of the commercial buildings are located at the back of the sidewalk. There are more than 40 driveways on each side of US 60 and 11 intersecting streets.

The section of US 60 passing through Claypool from MP 244.7 to MP 247.1 consists of 2-lanes in each direction with a raised median that varies from 6-ft. to 12-ft. in width. There are about 50 driveways on the south side and about 25 driveways on the north side. There are 13 intersecting streets including the intersection of SR 188; 3 of the intersections are signalized. There are 2-at-grade railroad crossings.

From MP 247.1 to MP 250.1 through the western part of Globe US 60 consists of 2-lanes in each direction and a continuous turning lane. There are approximately 70 driveways on the south side of US 60 and about 55 driveways on the north side. There are 3 signalized intersections.

US 60 from MP 250.1 to 251.9 is a 5-lane section with a continuous turning lane. This section is a mix of older commercial buildings and residential units. Many of the buildings are located at the back of sidewalk. There are more than 50 driveways on each side of US 60 and 21 intersecting streets. Two intersections are signalized.

From MP 251.9 to the end of the study at MP 252.23, US 60 consists of 2-lanes of through traffic and a continuous turning lane. Development adjacent to US 60 consists of newer businesses including fast food restaurants, motels, and gas stations. There are several driveways on

each side of US 60 and two intersections. The intersection at US 70 is signalized.

Property along existing US 60 through Segment D is primarily in private ownership. The Tonto National Forest boundary crosses US 60 at MP 241.63. Land southwest of this boundary is national forest land while property along US 60 northeast of this boundary is privately owned. Essentially all of the property along the newly defined corridor south of existing US 60 is within the Tonto National Forest.

There are 10 bridges located along US 60 within Segment D:

- A 3-span concrete slab bridge crosses Bloody Tank Wash at MP 242.72 (Str. No. 0450).
- A 3-span concrete T beam bridge crosses Bloody Tank Wash at MP 243.71 (Str. No. 173).
- A 7-span concrete slab bridge crosses Pinal Creek at MP 249.64 (Str. No. 266).
- A 6-span concrete slab bridge crosses Pinal Creek at MP249.80 (Str. No. 036).
- A 4-span Prestressed Concrete Pedestrian Overpass crosses US 60 at MP 250.34 (Str. No. 1788).
- A 5-span concrete slab bridge crosses Pinal Creek at MP 250.37 (Str. No. 549).
- A 3-span prestressed concrete bridge crosses Pinal Creek at MP 250.53 (Str. No. 1785)
- A 3-span Concrete T Beam bridge crosses US 60 at MP 250.75 (Str. No. 1786)
- An 8-span Concrete Box Girder bridge carries US 60 at MP 250.90 (Str. No. 1787)
- A single span Steel Girder Pedestrian Overpass crosses US 60 at MP 251.27 (Str. No. 488)
- A 6-span Concrete T beam bridge crosses Mc Millen Wash at MP 251.75 (Str. No. 1028)

There are numerous utility features along this segment of existing US 60. Utility companies include APS, Quest, SRP, Arizona Water Co., Southwest Gas, El Paso Natural Gas, Cable One, City of Globe, Arizona Eastern Railroad Co.

The numerous driveways and intersections create conflicts with through traffic that constrict capacity of the existing highway. The presence of numerous commercial and residential properties adjacent to the narrow right-of-way makes it very difficult to improve the existing roadway to meet current design requirements for a 7-lane section (see Section 2,

Traffic and Accident Data). Acquisition of properties to widen the right of way would have a significant impact on the businesses and residents in the Miami/Globe area, and the cost of acquiring adequate right of way would be extremely high. The need for access from adjacent properties would still be present unless access rights could be acquired. These factors result in the conclusion that improvement of the existing facility to provide an adequate highway through the design year is not feasible and would not provide the desired level of service. It is recommended that a bypass route be developed and that the existing US 60 through the Globe/Miami area be maintained by ADOT as a business route and a connection to SR 188.

The area north of Miami and Globe is where the majority of the mining activity has been and mining will continue in this area in the future (see **Figure 4-2**). There is extensive mining development and the mining has resulted in huge tailing piles being placed in the area. In addition, the terrain becomes very steep and mountainous just north of the developed sections of the two towns (see **Figures 4-1, & 4-2**). It was suggested during scoping sessions that there are no feasible east-west highway corridors north of existing US 60. However, if it becomes feasible to build through the mining properties, these alternatives can be considered. Alternatives north of US 60 through this segment are described in Segment F.

South of US 60 and the Miami and Globe area, the Segment D corridor has been identified that departs from existing US 60 near MP 240, turns to the east and continues easterly just north of Granite Point towards SR 77. This corridor would bypass both Miami and Globe and cross several drainage courses through mountainous terrain.

Within this corridor two alternative alignments were identified. Both of them would begin at MP 240 and curve to the east from existing US 60. One alternative continued in a generally easterly direction, north of Granite Point, across Russell Gulch, Ice House Canyon and Six Shooter Canyon to an intersection with SR 77 approximately two miles south of Globe (see **Figure 4-2**). This alternative would go through substantial residential development in the canyons south of Globe. The development is extensive enough that it was not possible to find a route that would not have substantial impact on the residential properties. The terrain in the location of this alternative is quite steep and the canyons are deep. Development of vertical alignment that meets ADOT Design Guidelines would require large cuts and fills, along with large drainage structures. Therefore this alternative was found to be unacceptable and dropped from further consideration.

The other alternative in the new corridor would follow the same alignment past Granite Point. However, just east of Granite Point the alignment would turn to the south for approximately two miles, and then turn back to the east, proceeding easterly towards an intersection with SR 77 approximately four miles south of Globe. Segment D will end about two miles west of SR 77 in an area known locally as “The Gap.” This alternative is located south of the residential development and passes through much less severe terrain. Therefore, this alternative has been found to be feasible and will be described more fully as Alternative D-1.

Alternative D-1: Alternative D-1 begins as a continuation of Segment C and will match both Alternatives C-1 and C-2. Alternative D-1 consists of constructing a new divided highway from US 60, MP 240 to “The Gap” located approximately 2 miles west of SR 77 (see **Figure 4-6** and plan/profile sheets in the **Appendix**). The alignment is located from 1 to 4 miles south of the Globe/ Miami area as the alignment proceeds from west to east. The eastbound and westbound roadways are on independent alignment but are generally parallel. Alternative D-1 is the only alternative currently being developed for Segment D.

The Alternative D-1 alignments continue east for about 4 miles, staying north of Granite Point. Just east of Granite Point the alignments turn to the south for about 2 miles. Near Russell Gulch the alignments again turn to the east and proceed towards SR 77. Segment D ends in an area known locally as “The Gap” about 2 miles east of SR 77.

An access road will be included that will connect existing US 60 and Copper Springs Canyon to an at-grade intersection and median crossing on the new highway at approximately MP 240.1. This intersection will provide the Globe/Miami area with access to and from the west.

An access road will tie Russell Gulch Road and Kellner Canyon Road to a single median crossover intersection with the new highway. Access will also be provided to Kellner Campground. Access to local roads will also be provided at Ice House Canyon Road, Six Shooter Canyon Road, and to a local road located near the end of Segment D that serves as access to Tonto National Forest land and ties into Six Shooter Road north of new US 60.

Drainage along Alternative D-1 flows generally from south to north. Preliminary analysis indicates that 14 new box culverts will be required to pass drainage flow through the new alignment. No bridges will be required. Minor drainage structures will be analyzed in future studies.

Issues to be addressed for Alternative D-1 include:

- Existing US 60 will remain in place for traffic use during construction.
- Alternative D-1, by itself, will not be a usable segment. It will have to be combined with all or part of Segment E and all or part of Segment C to provide logical termini for traffic.
- The entire alignment is located on Tonto National Forest land.
- Existing US 60 through Globe/Miami will be maintained as a business route and connection to SR 188

4.2.6 Segment E (“The Gap” to Jct. US 60 Near MP 254):

Segment E begins at an area known locally as “The Gap” which is located approximately two miles west of SR 77 and approximately four miles south of Globe (see **Figure 4-7**). The alignment is a continuation of Segment D.

Alignments considered in Segment E include:

- A divided alignment that continues easterly from The Gap for about 0.5 miles, then gradually curves to the north for about 2 miles, joining existing SR 77 alignment near SR77 MP 169.6. It follows SR 77 for approximately 1.5 miles to a crossing of US 70. It then continues northerly to an intersection with US 60 near US 60 MP 254 and the end of the study.
- A divided alignment that curves to the northeast at The Gap and continues for about 2.9 miles, joining existing SR 77 near SR 77 MP 170. It follows SR 77 for approximately 1 mile to a crossing of US 70, then curves easterly for about 0.5 mile and continues northerly to an intersection with US 60 near US 60 MP 254.5 and the end of the study.

Segment E is essentially in two parts. The southern sub-segment extends from The Gap to the intersection of SR 77 and US 70. The northern sub-segment extends from the US 70/SR 77 intersection to the end of the Segment at the connection with existing US 60 near MP 254.

US 60 in Segment E is generally on Tonto National Forest land south and west of US 70. From US 70 northerly to the end of the segment property is owned by the Bureau of Land Management (BLM), State Trust Lands and private owners. A Middle School is now being proposed on property owned by the State Land Dept. that appears to be close to Alternative E-1, between US 70 and US 60.

The predominate drainage flow pattern south of US 70 is from west to east across existing SR 77 towards Gilson Wash. North of US 70 drainage flows to the east towards Ramboz Wash. Several minor washes cross both of the Segment E alternatives. Preliminary analysis indicates 9 box culverts will be required. The need for minor culverts will be determined during future studies

Utilities within Segment E include Southwest Gas, Arizona Public Service, SRP, Quest and Cable One. The Arizona Eastern Railroad has a single track located approximately 600-feet north of US 70. The railroad crosses both improvement alternatives in Segment E.

Alternative E-1: Alternative E-1 consists of constructing a new divided highway from “The Gap” west of SR 77 and southeast of Globe to US 60 near MP 254 northeast of Globe.

The E-1-South alignment begins as a continuation of Alternative D-1 and continues east and north, joining the alignment of SR77 near SR77 MP 169. An at-grade median crossing will be constructed to provide access to SR 77 to the south. A northbound on-ramp to the new northbound lanes will be provided along the existing SR 77 roadway. North of the point where Alternative E-1 joins SR 77, the existing SR 77 pavement will be used for the northbound lanes and a new southbound roadway will be constructed west of the existing SR 77 roadway.

New bridges will be constructed at the junction of new US 60 and US 70 to provide a grade separated half-diamond traffic interchange for these two major highways. A southbound on-ramp and a northbound off-ramp will be provided. Alternative E-1-South ends at the crossing of US 70.

Alternative E-1-North begins at the crossing of US 70. The southbound off and northbound on movements between US 70 and new US 60 will not be provided because the location of the Arizona Eastern Railroad tracks precludes the use of a standard diamond interchange and these movements can be accommodated at the connection of new US 60 and existing US 60 northeast of Globe.

Alternative E-1-North will be separated from and cross over the Arizona Eastern Railroad with two new bridges.

Alternative E-1-North will continue in a northerly direction, joining existing US 60 near MP 254 northeast of Globe. A directional grade separated ramp from existing westbound US 60 to the new westbound US 60 will be constructed and a directional at-grade ramp will be constructed for eastbound traffic from the new highway to existing US 60.

Issues to be addressed for Alternative E-1 include:

- Existing US 60 will remain in place for traffic use during construction.
- Traffic can be maintained on existing SR 77 during construction of the new parallel roadway. After the new roadway is complete traffic can be moved onto it while existing SR 77 is brought to current standards.
- US 70 can remain in service while the ramp connections and overcrossing structures are constructed. Traffic control and minor detours may be required.
- Alternative E-1, by itself, will not be a usable segment. It will have to be combined with Segment D to provide logical termini for traffic.
- The configuration of the US 60/US 70 interchange should be reviewed to determine if there is a long range need for a full interchange. If a full interchange will ultimately be needed, the first stage interchange should be designed to accommodate a later addition.

Details of this alternative are shown in the plan sheets in the **Appendix**, including preliminary vertical profiles.

Alternative E-2: Alternative E-2 is similar to Alternative E-1. It also consists of constructing a new divided highway from west of SR77 southeast of Globe to US 60 near MP 254.5 northeast of Globe.

Alternative E-2-South begins at the end of Alternative D-1 and immediately turns northeast, staying north of Alternative E-1-South until it joins existing SR 77 near SR 77 MP 170. An at-grade median crossing will be installed to provide access to SR 77 to the south. A northbound on-ramp to the new northbound divided highway will be constructed along the existing SR 77 roadway. North of the point where Alternative E-2-South joins SR77, the existing SR77 pavement will be used for the northbound roadway and a new roadway will be constructed west of existing SR 77 roadway to carry southbound traffic.

A half-diamond traffic interchange with a southbound on-ramp and a northbound off-ramp will be provided at the junction of the new divided highway and US 70. Alternative E-2-South ends at the crossing of US 70.

Alternative E-2-North begins at the crossing of US 70. The southbound off and northbound on movements will not be provided because the location of the Arizona Eastern Railroad tracks precludes the use of a standard diamond interchange and these movements can be accommodated at the connection of new US 60 and existing US 60 northeast of Globe.

New US 60 will be separated from and cross over the Arizona Eastern Railroad with two new bridges.

Alternative E-2-North is located about 0.5 miles east of Alternative E-1-North and will connect to existing US 60 near MP 254.5, northeast of Globe. A directional grade separated ramp from existing westbound US 60 to the new westbound US 60 will be constructed and a directional at-grade ramp will be constructed for eastbound traffic from the new highway to existing US 60.

Issues to be addressed for Alternative E-2 include:

- Existing US 60 will remain in place for traffic use during construction.
- Traffic can be maintained on existing SR 77 during construction of the new parallel roadway. After the new roadway is complete traffic can be moved onto it while existing SR 77 is brought to current standards.
- US 70 can remain in service while the ramp connections and overcrossing structures are constructed. Traffic control and minor detours may be required.
- Alternative E-2, by itself, will not be a usable segment. It will have to be combined with all or part of Segment D-1 to provide logical termini for traffic.
- The configuration of the US 60/US 70 interchange should be reviewed to determine if there is a long range need for a full interchange. If a full interchange will ultimately be needed, the first stage interchange should be designed to accommodate a later addition.

Details of this alternative are shown in the plan sheets in the **Appendix**, including preliminary vertical profiles.

4.2.7 Segment F (Bypass Alternatives North of Miami/Globe):

In the vicinity of the Towns of Miami and Globe, the US 60 Initial Feasibility Study evaluated only routes that were located south of the these Towns. Since a substantial amount of traffic uses US 60 to access Roosevelt Lake via SR 188, the Tonto National Forest had asked that this study consider extending SR 188 south from its current terminus with US 60 to a new intersection with the identified alternatives in Segment D. This new connection would require construction through developed residential areas and impact environmentally sensitive features of Russell Gulch, so this connection was abandoned. Access to SR 188 from the current alternatives being considered will remain via existing US 60, which intersects the new alternatives approximately 4 miles west of Miami and approximately 2 miles east of Globe.

As a follow-up, the Forest Service requested that a new alternative be considered, one that would relocate US 60 to the north of the Miami/Globe area and would connect to SR 188 north of the existing intersection. If found, this would be a more direct route for travelers destined for Roosevelt Lake and the Rim country of Payson via SR 188 / SR 87. Segment F was thereby added to this study to determine if there are viable alternatives for US 60 north of the Towns of Miami and Globe.

Early in the scoping process of the Feasibility Study, alternative routes were considered north of Miami and Globe. It was given a cursory review as most participants in the public and agency scoping meetings felt going north of the mining operations was not reasonable. The primary constraints for developing an alternative to the north are:

- **Mines:** The Miami/Globe area is the site of extensive mining operations. There are many large tailing piles, tailing ponds, open pit mines, concentrators, and other mining facilities in the area. Most of the large operations are located north of the towns and are on private property. There are also numerous mineshafts and exploratory mining sites throughout the area. Although mining activity is at a low level at the present time, it is likely that extensive mining operations will take place in the future. Any highway location will have to avoid existing mining facilities and current properties owned by the mines, regardless if those lands have been disturbed to date.

- **Terrain:** The terrain to the north of existing US 60 is extremely mountainous with numerous peaks and short ridges separated by deep drainage channels that are actually canyons. Natural slopes throughout the area approach 1-foot vertical to 1-foot horizontal (1:1) in the transitions from peaks to canyons. The orientation of the peaks, ridges and canyons is irregular in that there is no defined overall slope through the area.

Because of the severity of the terrain, it is assumed that any highway alignment would incorporate a divided roadway section with each direction on independent alignments.

Beginning near Pinto Valley Road, and proceeding northerly and easterly around Miami and Globe, major terrain features include the following:

- | | |
|------------------------------|--------------------|
| ○ Needle Mountain | ○ Gerald Hills |
| ○ Pinto Canyon | ○ Gerald Gulch |
| ○ Camelback Mountain | ○ Pinal Creek |
| ○ Day Peak | ○ SR 188 |
| ○ Skunk Canyon | ○ Kings Canyon |
| ○ Flat Top Mountain | ○ Bull Hill |
| ○ Granite Basin | ○ Globe Hills |
| ○ Ruin Basin | ○ Henrietta Canyon |
| ○ Sleeping Beauty (Mountain) | ○ Ramboz Peak |
| | ○ Ramboz Wash |

- **Design:** Alternatives must meet the requirements of Section 5, Major Design Features of this Feasibility Study.

Identification and Evaluation of Potential Route Alternatives:

Through this segment, there is one base corridor alignment, with some optional alignments through some of the canyons. The base corridor is defined as Alternative F-1.

Alternative F-1: To the west of Miami there is a narrow corridor between private mining properties in the vicinity of Pinto Valley Road and Castle Dome Road that was investigated for a route to the north of existing US 60. The Segment F route generally follows Castle Dome Road for approximately 2.5 miles, and then turns northeasterly, following Little Pinto Canyon for about 1 mile. It then continues northerly around the east side of Camelback Mountain for about 2.5 miles to the southerly end of Granite Basin. Acceptable horizontal

alignment can be achieved through this section of the route. Vertical grades are about 6-7 percent for the first 2.5 miles. A bridge approximately 75 feet above Little Pinto Canyon would be necessary to cross the canyon. Another bridge would likely be required across Webster Gulch near Bohme Ranch. Acceptable grades could be achieved around the east side of Camelback Mountain, however traversing the mountain slope would require extensive earthwork since the roadway would have to be benched into 3:1 to 4:1 slopes.

From the south end of Granite Basin, the route continued northerly along the east side of Granite Basin, around the west side of Flat Top Mountain, for about 2-miles, and then turns easterly and follows FR 225 along Gerald Wash across Ruin Basin. However, FR 225 and Gerald Wash cut through the Gerald Hills through a narrow canyon that does not appear to be wide enough to accommodate a highway. The mountain slopes rise from the bottom of the wash on about a 1:1 slope, and the horizontal alignment through the wash is unacceptable for a highway, creating what appears to be a fatal flaw of this particular alignment, however, it was the only means of crossing though the Gerald Hills and reach SR 188.

Other routes southerly through Ruin Basin were examined but none were found to be feasible to get from FR 225 easterly across the Gerald Hills. Ruin Basin is essentially a boxed basin on the south end with extremely steep terrain extending from Flat Top Mountain easterly to the Gerald Hills.

Assuming an alignment is found acceptable through the Gerald Hills, the feasibility of developing an alignment to US 60 becomes much easier as the topography is much less abrupt. Once over SR 188, the alignment continues easterly crossing south of Nugget Mesa through the Nugget Wash, then traversing up Henrietta Canyon and Ramboz Wash to the south side of Quartzite Peak. On the southern foothills of this range, the alignment heads east following an existing jeep trail before joining the existing US 60 roadway alignment just south of Quartzite Wash.

While this northerly alignment does make travel to Roosevelt Lake much shorter, travel to Safford and all points east on US 70 and SR 77 must now “back-track” on US 60.

Table 4-1 Feasibility Concept Alternatives Evaluation Summary—Design Factors

Evaluation Factor	A-2	A-3a/A-3b	A-4
Construction Cost	<ul style="list-style-type: none">2nd lowest cost (\$121.9 million)\$14.6 million Devil Canyon Bridges11.42 miles long	<ul style="list-style-type: none">A-3a - Moderate cost (\$139.9 million)A-3b - Lowest cost (\$101.0 million)\$21.5 million EB Tunnel, \$28.0 million WB Tunnel\$7.5 million EB Queen Creek Bridge\$6.9 million WB Devils Canyon Bridge5.79 miles long	<ul style="list-style-type: none">Highest cost (\$382.7 million)\$107.7 million Tunnels\$14.6 million Devils Canyon Bridges10.21 miles long
Right-of-Way	<ul style="list-style-type: none">9 acres private land994 acres TNF land	<ul style="list-style-type: none">68 acres private land57 acres TNF land	<ul style="list-style-type: none">438 acres private land396 acres TNF land
Utility Impacts	<ul style="list-style-type: none">SRP 115 kV power line crossing (3)SRP 230 kV power line crossing (2)SRP 500 kV power line crossing (2)APS 500 kV power line crossing	<ul style="list-style-type: none">SRP 115 kV power line crossing (4)Telephone line crossing (4)APS 500 kV power line crossing	<ul style="list-style-type: none">SRP 115 kV power line crossing (3)SRP 230 kV power line crossing (3)SRP 500 kV power line crossing (3)Telephone line crossing (2)APS 500 kV power line crossing
Maintenance of Traffic during Construction	<ul style="list-style-type: none">Traffic can be maintained on the existing road during constructionMinor detours and traffic control will be required at connection points between existing and new construction.Has the least impact on traffic during construction.	<ul style="list-style-type: none">Construction of either the viaduct section (Alt. A-3a) or the 5-lane section (Alt. A-3b) from MP 229 to MP 230 must take place while maintaining traffic. A detour is not available.Traffic delays must be held to a minimum.Is the least desirable relative to maintenance of traffic.	<ul style="list-style-type: none">From the beginning of Segment A to MP 230 and from MP 231 to the end of Segment A, traffic can be maintained on the existing road during construction of all 4- lanes.From MP 230 to MP 231 traffic would have to be moved from the existing road to new westbound lanes to reconstruct existing.Minor detours and traffic control will be required.Has some impact on traffic.
Access and Property Impacts	<ul style="list-style-type: none">Bypasses Superior (furthest away)Awkward access to Superior provided at MP 222.7 & 234.61 access point & median crossover provided near Silver King SubstationLocal access provided by existing US 60 between MP 222.7 and MP 234.6No direct connection to SR 177Awkward access to Oak Flat CampgroundRequires construction of west 1.3 miles of Alt B-2 to make a useable section	<ul style="list-style-type: none">Best Access to Superior (through Superior)Existing access maintained through improved 5-lane section through SuperiorDirect access to SR 177 with new interchangeGood access to Oak Flats Campground at new access point and median crossover at MP 231.0WB access provided from new WB roadway near Silver King SubstationExist access maintained through Devils Canyon	<ul style="list-style-type: none">Bypasses SuperiorAwkward access to Superior provided at MP 222.7 & 230.3Additional access points & median crossovers provided at Silver King Road, Oak Flat (MP 231), Exist US 60 at MP 231.3, and Silver King SubstationNo direct connection to SR 177
Roadway Geometry and Safety	<ul style="list-style-type: none">Very Good horizontal alignment ($D \leq 2^\circ$)Good separation of opposing trafficDesign Speed = ADOT desireable of 60 mph5.5 miles continuous 6% upgrade	<ul style="list-style-type: none">Fair horizontal alignment ($D \leq 6^\circ$)No separation of opposing traffic from MP 224 to MP 227Conc. Barrier separation of opposing traffic (MP 229 to MP 230)Design Speed = 55 mph2.5 miles & 1.0 mile sections of continuous 6.0% upgrade	<ul style="list-style-type: none">Good horizontal alignment ($D \leq 5^\circ$)Large separation of opposing trafficDesign Speed = 60 mph (one curve DS = 55 mph)3.5 miles of continuous 6% upgrade
Earthwork	<ul style="list-style-type: none">Very large volume of fill materialLarge volume of cut material150’ deep fill section (1400 LF)200’ deep fill section (270 LF)100’ deep fill section (1320 LF)175’ deep cut section (1800 LF near Fortuna Peak)	<ul style="list-style-type: none">small volume of cut and fill material115’ deep fill section (300 LF)	<ul style="list-style-type: none">Very large volume of cut materialLarge volume of fill material125’ deep cut section (1800 LF)200’ deep cut section (1200 LF)280’ deep cut section (1500 LF)125’ deep cut section (1100 LF)
Drainage Impacts	<ul style="list-style-type: none">10 major wash crossings incl. Silver King Wash & Devils Canyon7 minor wash crossings	<ul style="list-style-type: none">14 major wash crossings incl. Silver King Wash, Queen Creek, Waterfall Canyon, and Devils Canyon2 minor wash crossingsMajor impacts to Queen Creek Canyon	<ul style="list-style-type: none">12 major wash crossings incl. Silver King Wash & Devils Canyon4 minor wash crossings
Environmental Considerations	<ul style="list-style-type: none">Long alignment through undisturbed terrain with large cut and fill sectionsLeast noise disturbanceMinor risk to riparian habitat in Silver King Wash & Queen Creek	<ul style="list-style-type: none">Significant impact to Queen Creek CanyonMost noise disturbanceExtreme risk to riparian habitat in Queen Creek CanyonModerate disturbance to mining	<ul style="list-style-type: none">Cuts and fills of new roadway will be visable from SuperiorModerate noise disturbanceMinor risk to riparian habitat in Silver King WashMajor disturbance to mines

Evaluation Factor	B-1	B-2	B-3
Construction Cost	<ul style="list-style-type: none"> Moderate cost (\$15.1 million) 3.27 miles long 	<ul style="list-style-type: none"> High cost (\$21.0 million) 3.34 miles long 	<ul style="list-style-type: none"> Low cost (\$13.0 million) 3.10 miles long
Right-of-Way	<ul style="list-style-type: none"> 28 acres Private land 70 acres TNF land 	<ul style="list-style-type: none"> 99 acres Private land 143 acres TNF land 	<ul style="list-style-type: none"> 11 acres Private land 30 acres TNF land
Utility Impacts	<ul style="list-style-type: none"> SRP 115 kV power line crossing 	<ul style="list-style-type: none"> SRP 115 kV power line crossing (2) 	<ul style="list-style-type: none"> SRP 115 kV power line crossing (2) Telephone line crossing
Maintenance of Traffic during Construction	<ul style="list-style-type: none"> Westbound lanes can be constructed with traffic on existing US 60. Traffic can be routed over new westbound lanes while existing is upgraded for eastbound roadway. Local access will have to be maintained while existing roadway is being upgraded. Moderate impact on traffic during construction. 	<ul style="list-style-type: none"> New roadway is separated from existing US 60. Traffic can be maintained on existing during construction. Minor detours and traffic control will be needed at connections between new and existing roadways. Local access will be maintained from existing roadway. Minimal impact on traffic during construction. 	<ul style="list-style-type: none"> Widening of the existing roadway will have to be phased to maintain traffic Access to adjacent properties will have to be maintained through construction. Significant impact on traffic during construction.
Access and Property Impacts	<ul style="list-style-type: none"> Existing access to private property will have to be maintained Good eastbound access to the Top of the World residential area Westbound access to the Top of the World area awkward at MP 234.6 and MP 236.2 Lane configuration with 3-lanes plus continuous left-turn lane through Top of the World is undesirable. 	<ul style="list-style-type: none"> Bypasses Top of the World residential area Access to the Top of the World area awkward at MP 234.6 and MP 236.4 Local access to private property maintained on existing US 60 	<ul style="list-style-type: none"> Best access to Top of the World residential area Existing access maintained with improved 5-lane section Through traffic will mix with local traffic in 5-lane section New right-of-way required from developed parcels
Roadway Geometry and Safety	<ul style="list-style-type: none"> Fair horizontal alignment ($D \leq 6^\circ$) Large separation of opposing traffic Design Speed = ADOT desirable of 60 mph 3 EB curves with DS=55mph 	<ul style="list-style-type: none"> Very good horizontal alignment ($D \leq 3^\circ$) Good separation of opposing traffic Good separation of through traffic from local traffic Design Speed = ADOT desirable of 60 mph 	<ul style="list-style-type: none"> Fair horizontal alignment ($D \leq 6^\circ$) No separation of opposing traffic with 5-lane section from MP 234.2 to MP 236.2 Design Speed = 55 mph 0.5 mi 6% upgrade for WB roadway
Earthwork	<ul style="list-style-type: none"> Very small volume of cut Small volume of fill 125' deep fill section (450 LF) 	<ul style="list-style-type: none"> Small volume of cut Small volume of fill 125' deep fill section (450 LF) 110' deep cut section (350 LF) 	<ul style="list-style-type: none"> Large volume of cut Very small volume of fill
Drainage Impacts	<ul style="list-style-type: none"> 3 major wash crossings and 2 minor wash crossings (EB) 1 WB major wash crossing and 1 minor crossing 	<ul style="list-style-type: none"> 1 major wash crossing 1 minor wash crossing 	<ul style="list-style-type: none"> 3 major wash crossings (EB) 1 major WB wash crossing 1 minor wash crossing
Environmental Considerations	<ul style="list-style-type: none"> Moderate noise disturbance from EB truck traffic through residential area 	<ul style="list-style-type: none"> Least noise disturbance 	<ul style="list-style-type: none"> Deep cut in Iron Canyon will affect scenic attributes Most noise disturbance from truck traffic through residential area Moderate disturbance to riparian area in Iron Canyon

Evaluation Factor	C-1	C-2	
Construction Cost	<ul style="list-style-type: none"> Low cost (\$36.6 million) \$10.3 million Pinto Creek Bridge 3.52 miles long 	<ul style="list-style-type: none"> High cost (\$57.8 million) \$19.4 million Pinto Creek Bridges 3.11 miles long 	
Right-of-Way	<ul style="list-style-type: none"> 11 acres private land 181 acres TNF land 	<ul style="list-style-type: none"> 10 acres private land 236 acres TNF land 	
Utility Impacts	<ul style="list-style-type: none"> SRP 115 kV power line crossing Telephone line crossing 	<ul style="list-style-type: none"> Telephone line crossing (2) 	
Maintenance of Traffic during Construction	<ul style="list-style-type: none"> Eastbound lanes can be constructed with traffic on existing US 60. Traffic can be routed over new eastbound lanes while existing is upgraded for westbound roadway. Moderate impact on traffic during construction. 	<ul style="list-style-type: none"> New roadway is separated from existing US 60. Traffic can be maintained on existing during construction. Minor detours and traffic control will be needed at connections between new and existing roadways. Local access will be maintained from existing roadway. Minimal impact on traffic during construction. 	
Access and Property Impacts	<ul style="list-style-type: none"> New single access point near MP 239.5 for Miami & Globe, Pinto Valley Road, Castle Dome Road, and Pinto Creek Road. Eastbound & westbound roadways are connected with a 1600 LF median crossover at the access point. 	<ul style="list-style-type: none"> New access road & median crossover for Pinto Valley Road near MP 239.5. Local access from existing US 60 New access to Miami and Globe near MP 240.5 (Segment D) 	
Roadway Geometry and Safety	<ul style="list-style-type: none"> Poor WB horizontal alignment ($D \leq 6^\circ$) Good EB horizontal alignment ($D \leq 3^\circ$) Large separation of opposing traffic Design speed = 55 mph WB and 60 mph EB 1.0 mile continuous upgrade 	<ul style="list-style-type: none"> Good horizontal alignment ($D \leq 4^\circ$) Good separation of opposing traffic Design speed = ADOT desirable of 60 mph 1.0 mile continuous upgrade 	
Earthwork	<ul style="list-style-type: none"> Small volume of cut Very small volume of fill 140' deep cut section (450 LF) 	<ul style="list-style-type: none"> Large volume of cut Small volume of fill 160' deep cut section (400 LF) 	
Drainage Impacts	<ul style="list-style-type: none"> 4 major wash crossings incl. Bronx Wash & Pinto Creek (EB) 2 major wash crossings incl. Bronx Wash & Pinto Creek (WB) 1 minor wash crossing EB and 4 minor wash crossings WB 	<ul style="list-style-type: none"> 3 major wash crossings incl. Bronx Wash and Pinto Creek 1 minor wash crossing 	
Environmental Considerations	<ul style="list-style-type: none"> Moderate disturbance to mines 	<ul style="list-style-type: none"> Moderate disturbance to mines 	

Evaluation Factor	E-1	E-2	
Construction Cost	<ul style="list-style-type: none"> Low cost (\$36.1 million) \$1.6 million various bridges 6.46 miles long 	<ul style="list-style-type: none"> High cost features (\$43.1 million) \$1.6 million various bridges 7.04 miles long 	
Right-of-Way	<ul style="list-style-type: none"> 14 acres private land 256 acres TNF land 88 acres state trust land Railroad grade separation 	<ul style="list-style-type: none"> 63 acres private land 330 acres TNF land 50 acres state trust land Railroad grade separation 	
Utility Impacts	<ul style="list-style-type: none"> El Paso Natural Gas line crossing 	<ul style="list-style-type: none"> El Paso Natural Gas line crossing 	
Maintenance of Traffic during Construction	<ul style="list-style-type: none"> 4.9 miles of Alternative E-1 is separated from existing roads and can be constructed without interfering with traffic. 1.6 miles of Alternative E-1 will use existing SR 77 for the eastbound roadway. The westbound lanes can be constructed and traffic moved to the new roadway while existing SR 77 is upgraded. Minor detours and traffic control will be needed. Moderate impact on traffic during construction. 	<ul style="list-style-type: none"> 5.8 miles of Alternative E-2 is separated from existing roads and can be constructed without interfering with traffic. 1.2 miles of Alternative E-2 will use existing SR 77 for the eastbound roadway. The westbound lanes can be constructed and traffic moved to the new roadway while existing SR 77 is upgraded. Minor detours and traffic control will be needed. Moderate impact on traffic during construction. 	
Access and Property Impacts	<ul style="list-style-type: none"> New at-grade access roadway to connect NB and SB SR 77 traffic New grade separated interchange at US 70 with NB-off and SB-on ramps New NB on ramp and grade separated SB off-ramp at US 60. Less impact on private property 	<ul style="list-style-type: none"> New at-grade access roadway to connect NB and SB SR 77 traffic New grade separated interchange at US 70 with NB-off and SB-on ramps New NB on ramp and grade separated SB off-ramp at US 60. More impact on private property 	
Roadway Geometry and Safety	<ul style="list-style-type: none"> Very good horizontal alignment ($D \leq 3^\circ$) Good separation of opposing traffic Design speed = 70 mph Design speed at US60/SR 77 junction = 60 mph 1.4 miles total upgrade at 5% or more 	<ul style="list-style-type: none"> Very good horizontal alignment ($D \leq 3^\circ$) Good separation of opposing traffic Design speed = 70 mph Design speed at US60/SR 77 junction = 60 mph 1.1 miles at 5% upgrade 	
Earthwork	<ul style="list-style-type: none"> Very small volume of cut Very small volume of fill 	<ul style="list-style-type: none"> Small volume of cut Small volume of fill 	
Drainage Impacts	<ul style="list-style-type: none"> 12 major wash crossings 2 minor wash crossings 	<ul style="list-style-type: none"> 16 major wash crossings WB & 14 EB 2 minor wash crossing WB & 4 EB 	
Environmental Considerations	<ul style="list-style-type: none"> Most noise disturbance 	<ul style="list-style-type: none"> Least noise disturbance 	

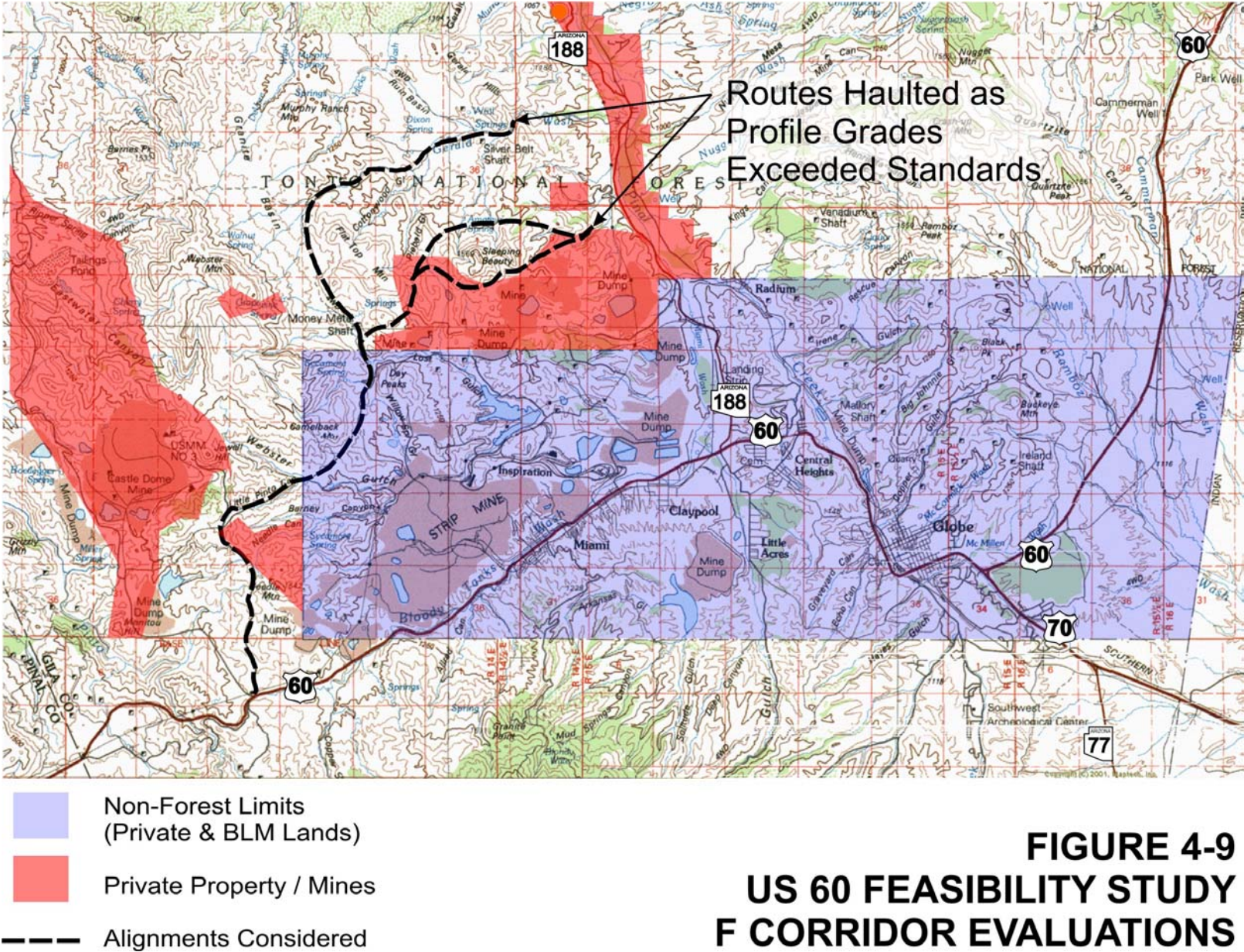
Table 4-2 Alternative Cost Estimates

DESCRIPTION	ALTERNATIVES											
	A-2	A-3a	A-3b	A-4	B-1	B-2	B-3	C-1	C-2	D-1	E-1	E-2
LENGTH (mi)	11.42	5.79	5.79	10.21	3.27	3.34	3.1	3.52	3.11	11.73	6.49	7.04
AVERAGE COST per MILE (million dollars) (Based on Florence Junction to Superior DCR)	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35
SEGMENT COSTS (million dollars)	15.4	7.8	7.8	13.8	4.4	4.5	4.2	4.8	4.2	15.8	8.8	9.5
SEGMENT EXCAVATION VOLUMES (million CY)	12.44	2.00	2.50	19.60	1.39	2.40	1.09	2.14	3.40	20.00	3.40	4.40
EXCAVATION COST per CY	3.50	5.00	5.00	5.00	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
EXCAVATION COST (million dollars)	43.54	10.00	12.50	98.00	4.87	8.40	3.82	7.49	11.90	70.00	11.90	15.40
Bridge Area (SF)	19,304	8,888	8,888	28,804	-	-	-	-	-	-	20,850	21,224
Bridge Cost per SF	75.00	75.00	75.00	75.00	-	-	-	-	-	-	75.00	75.00
Bridge Cost (million dollars)	1.45	0.67	0.67	2.16	-	-	-	-	-	-	1.56	1.59
Long Span Bridge Area (SF)	64,790	64,068	64,068	64,828	-	-	-	45,600	86,412	-	-	-
Long Span Bridge Cost per SF	225.00	225.00	225.00	225.00	-	-	-	225.00	225.00	-	-	-
Long Span Bridge Cost (million dollars)	14.58	14.42	14.42	14.59	-	-	-	10.26	19.44	-	-	-
Tunnel Length (LF)	-	1,400	1,075	5,350	-	-	-	-	-	-	-	-
Tunnel Cost per LF	-	20,000.00	20,000.00	20,000.00	-	-	-	-	-	-	-	-
Tunnel Cost (million dollars)	-	28.00	21.50	107.00	-	-	-	-	-	-	-	-
Median Section Length (LF)			3600									
Cost per LF for Retaining Wall			550									
Cost (million dollars)			1.98									
Viaduct Section Area (SF)		235,000										
Cost per SF for Bridge		75										
Cost (million dollars)		17.63										
Segment Subtotals (million dollars)	74.98	78.52	58.88	235.53	9.28	12.91	8.00	22.50	35.54	85.84	22.23	26.50
Environmental Impact Mitigation (4%)	3.00	3.14	2.36	9.42	0.37	0.52	0.32	0.90	1.42	3.43	0.89	1.06
Water Supply and Dust Palliative (3%)	2.25	2.36	1.77	7.07	0.28	0.39	0.24	0.68	1.07	2.58	0.67	0.79
Maintenance of Traffic (8%)	6.00	-	-	18.84	0.74	1.03	0.64	1.80	2.84	6.87	1.78	2.12
Maintenance of Traffic (15-20%)	-	15.70	8.83	-	-	-	-	-	-	-	-	-
Mobilization (10%)	7.50	7.85	5.89	23.55	0.93	1.29	0.80	2.25	3.55	8.58	2.22	2.65
Roadway and Structures Subtotal	93.73	107.58	77.72	294.41	11.60	16.14	10.00	28.13	44.43	107.29	27.78	33.12
Contingency (30%)	28.12	32.27	23.32	88.32	3.48	4.84	3.00	8.44	13.33	32.19	8.33	9.94
Construction Total (million dollars)	121.85	139.85	101.04	382.74	15.08	20.98	13.00	36.57	57.75	139.48	36.12	43.06

As noted in the text, Alternative F, while being carried forward for further consideration, was not developed to the point of having cost estimates prepared. As the terrain and length is similar to that of the D & E Alternatives, the combined cost of the D & E-2 Alternatives can be used for comparison purposes.

Alternatives F-2 and F-3: As an alternative to going through Ruin Basin and Gerald Hills, other routes were investigated that skirted the northern limits of the mining areas, and south of the Sleeping Beauty Hills. These alignments begin from the south end of Granite Basin as Alternative F-1, but then depart from this alignment to head easterly around the southern slopes of Flat Top Mountain. They continue easterly across the slopes of Sleeping Beauty Hills, and then continuing easterly through the mountain range following a drainage ravine that descends into Pinal Creek and a junction with SR 188.

Routes both north (Alternative F-2) and south (Alternative F-3) of Sleeping Beauty were investigated. Grades around Sleeping Beauty and easterly to the Gerald Hills will be in excess of 10 percent and horizontal curves will be 6-degree or sharper. The routes would have to traverse side slopes of 2:1 or steeper, resulting in very large amounts of earthwork. Once the route gets to the Gerald Hills, grades approaching 20 percent would be required to descend to Pinal Creek. These routes do not meet design requirements and are not acceptable. These alternatives were thus discontinued.



4.3 Evaluation of Alternatives

4.3.1 Evaluation Criteria

The alignment alternatives were evaluated according to the following criteria:

- **Construction Cost Features:** Costs were not estimated directly for each alternative at this stage of the Feasibility Study. Instead, an average cost per mile excluding bridge, tunnel, and earthwork costs was determined using the detailed costs from the Florence Junction to Superior DCR. The average cost per mile was determined to be \$1.35 million per mile. This cost was multiplied by the length of the segment and then added to earthwork costs, bridge costs and tunnel costs (see **Table 4-2**). Additional percentages were added for such items as mobilization and maintenance of traffic to arrive at the totals shown in **Table 4-1**. The earthwork costs are based on USGS topography so they are appropriate for comparison purposes only.
- **Right-of-Way:** Each Alternative was evaluated based upon the amount of right-of-way (R/W) required and the amount of private property needed. R/W needs have been estimated based on ADOT desirable standard widths and have been adjusted to accommodate the approximate cut and fill lines determined from USGS topography. The R/W required from State Land, National Forest land, or private property has been estimated based on assessor map data.

- **Utility Impacts:** The most significant utilities observed along the alternative routes were power transmission lines. The power lines cross the alignments at various locations and may necessitate relocation of a transmission tower or adjustment in the alignment. The number of such crossings were quantified for each alternative.
- **Maintenance of Traffic during Construction:** Compare the extent of impact to both local and through traffic during construction recognizing that there are no detours available.
- **Access and Property Impacts:** Some of the proposed alternatives for US 60 from Superior to Globe involve bypassing developed areas such as Superior, Top of the World, and the Globe/Miami area. Access to these areas was evaluated for each of the alternatives.
- **Roadway Geometry and Safety:** The relative safety and geometric desirability of an alternative will be measured by the degree of curvature for horizontal curves, the length of steep profile grades of each alternative, and traffic separation. For example, alignments with significantly sharper curves are considered less desirable than an alignment with very gentle, small degree of curvature. All alternatives meet or exceed the ADOT design recommendations for mountainous terrain.

- **Earthwork:** Rough earthwork volumes were calculated as well as the length and depth of the cuts and fills along the proposed alignment alternatives. This information will be used at this stage of the study to compare alternatives.
- **Drainage Impacts:** Impacts to the existing drainage patterns will be quantified by the number of wash crossings for each alternative.
- **Environmental Considerations:** The environmental considerations will include the number of archeological sites and historical sites impacted, visual impacts, noise impacts, effect on mining activities, and riparian areas impacted.

4.3.2 Evaluation Matrix

An evaluation was made of each design concept alternative based on the project objectives and evaluation factors described in Sections 1.4.1 and 1.4.2. An evaluation matrix is located in Table 4-1.

- Since there is only one alternative considered for Segment D, this segment is not included in the matrix.
- Segment F was initially discarded from detailed evaluation, as the crossings west of SR 188 were considered not desirable. While it will be carried forward for consideration as part of any future studies, this segment was not included in the matrix.

4.3.3 Public Opinion

On August 24, 1999, an open-house public meeting was held in Miami to offer the public an opportunity to review and comment on the alternatives being considered. A summary of the comments follows:

- Some residents of the Top of the World area expressed a desire to have any new alignments be as far as possible from their homes. One route suggested was on the south side of Signal Mountain.
- A resident suggested an alignment from the truck ramp on US 60 west of the Queen Creek Tunnel along the north side of Superior to Silver King Wash Road at which the alignment would tie back into the existing US 60.
- The fast food restaurants in Globe are dependent on US 60 traffic.
- Consider the need to accommodate bicycle traffic and recreational joggers.
- Consider alternative transportation modes such as mass transit, HOV lanes, commuter buses.
- Continue the concept of utilizing the existing roadway in Queen Creek Canyon for eastbound traffic with a new separate westbound roadway located to the north. Businesses along US 60 depend on US 60 traffic for their livelihood. Realignments will be bad for business.
- The Mayor of Globe expressed the opinion that a “bypass” of Globe would be a disservice to the businesses of the city. The city wants the traffic unlike Payson, which is considering a “bypass.” I-40 had a very negative economic impact to Holbrook. If a “bypass” becomes necessary due to traffic volumes, an alignment a lot closer to Globe than the alternative shown on the displays would be better. When alternative alignments are located close to a city like Flagstaff, the negative impacts to businesses are minimal.
- Traffic projections in the DCR must account for increased traffic caused by the improvement itself.
- A citizen indicated that a lot of good engineering went into the existing alignment of US 60 in the Globe-Miami area. Widening the existing roadway as necessary through this urban area similar to the widening project in Pinetop/Lakeside area would be preferable. The road through the Globe-Miami area is safe. There have not been any known fatalities in the urban areas of the alignment. The “bypass” located 3 miles south of town presents some response time challenges for emergency services.
- A surveyor was spotted staking a Globe “bypass” alignment 25 to 30 years ago.
- It would be shortsighted to put the improved roadway through the Top of the World community. It would be better to make long term decisions and avoid private parcels. Place both the eastbound and westbound roadways on the same side of the community and avoid placing the eastbound roadway on the south side of the community and the westbound roadway on the north side of the community. Place both roadways on the south side of Signal Mountain.
- The Globe-Miami area is not a destination point like Pinetop-Lakeside is. The mines may close 25 years from now. Globe-Miami is dependent on pass through traffic until this area becomes a destination point.
- There is very little private land along the US 60 corridor. Avoid taking private land for roadway purposes if possible.
- An owner of a business located on Broad Street has endured several ADOT improvement and realignment projects. His business is located in downtown Globe. Broad Street used to be the state highway through town. The roadway was widened in 1949 to accommodate increased traffic. The volume of traffic through downtown Globe made shopping for the residents of Globe very inconvenient. ADOT then realigned US 60 to Willow Street to “bypass” downtown Globe in 1959. This improved business for downtown merchants. This “bypass” was extended in 1976 from Oak Street to Hill Street again without a negative impact to the downtown. If these improvements had not been made, the local citizens of Globe would not be able to shop in downtown. Still, any new “bypass” needs to be close to town.
- Truck traffic projections may be low. Once the improvements are complete, trucks from the East Valley may prefer the straight-line route along US 60 and US 70 through Safford, Duncan and connect to I-10 at Lordsburg, New Mexico rather than take I-10 through Tucson and southern Arizona.
- An alternative route around Superior would be acceptable as long as the existing route through town is maintained for recreational purposes. There are a lot of recreational opportunities in the Queen Creek Canyon area east of Superior such as rock climbing. Any alternative route should be as close to Superior as possible. US 60 is an “Old West Highway.” Truck traffic may increase substantially with the proposed improvements as trucks take the “shortcut” to Lordsburg New Mexico.
- Arizona is a beautiful place as depicted in Arizona Highways magazine. US 60 needs to provide opportunities to safely enjoy the scenic character of the corridor. Scenic vista pullouts or rest areas may provide these opportunities.

- Who represents the residents of the Top of the World area since it is not incorporated and is in two counties?
- Make the north alignment around Peachville Mountain include both eastbound and westbound directions of traffic. The alignment begins in the Silver King Wash ravine, continues around Peachville Mountain, through the upper Queen Creek canyon, across Devils Canyon, along the north side of Top of the World and rejoining the existing alignment east of Top of the World.
- There is an active marble mine located in the upper Queen Creek Canyon in the SE ¼ of Section 17.
- Delete the proposed alignments on the west side of Top of the World, and the alignment that circles around the south side of Top of the World from the proposed westbound roadway to the existing US 60 because of the homes located in this area.
- The site of the old Suttons Summit Brothel may be considered historic. It is located along the historic US 60 east of Top of the World.
- The Carlota Mine is a new mine being developed in Pinto Valley in the W ½ of Section 4.
- SR 88 was renumbered SR 188 in August, 1999.
- There is a lot of residential development south of Globe near the east end of the alternative alignment shown. This development follows Icehouse Canyon and Six-shooter Canyon. Gila Pueblo Community College is located along Six-shooter Canyon near the location of the proposed alignment.

4.3.4 Alternative Comparisons

Using the evaluation presented in Table 4-1, a comparative analysis of the alternatives was made from which conclusions were drawn. The analysis revealed that in each instance of comparison, only a few evaluation factors were of major significance in determining which alternative was preferred. The following is a summary of the comparative analysis, describing the key factors and differences used in arriving at a conclusion.

For the purposes of this document, the objective is to define which alignment alternatives are to be carried forward into a final design concept analysis, and which alignment alternatives have significant flaws that remove them from further consideration. A Design Concept Report will evaluate each of the alignments carried forward in greater detail and ultimately recommend an alternative to be designed and constructed.

- **No-Build vs. Build Alternatives**

The No-Build Alternative involves no cost and no apparent change to the environmental features of the US 60 corridor. However, the No-Build Alternative:

- Will require continuing expenditures to rehabilitate and maintain an aging roadway.
- Will experience negative changes to noise and air quality as traffic volumes increase.
- Will not fulfill the goal of improving the safety, capacity, and traffic operational characteristics of the route.

Since the Town of Superior, the City of Globe, the County, and local citizens have all agreed that improvements are necessary for this portion of US 60, the No-Build Alternative is discouraged from selection.

Conclusion: The No-Build Alternative is not recommended.

- **Alternative A-2, A-3, and A-4**

The terrain and access to Superior present very difficult and costly options for Segment A. Alternative A-1 has been eliminated due to access challenges that couldn't feasibly be overcome (see Section 4.2.2 Alternate A-1).

Much of the cost of Alternative A-2 is because of its length and the amount of earthwork involved. It has huge cut and fill sections, but the earthwork volumes will probably be reduced as the alignments become more refined and the earthwork modeling becomes more precise in the DCR phase of the project. It avoids the necessity of major structures except for the two Devils Canyon bridges. Alternative A-2 has by far the best horizontal alignment of the A alternatives; however the 5.5 miles of 6% profile grade is not desirable. One large advantage is that fact that this alternative keeps all of the improvements north of the lands owned and impacted by the Resolution Copper Company.

Since the entire roadway is separated from the existing roadway, construction and traffic control will have minimal impact on traffic. The westerly 1.3 miles of Alternative B-2 will have to be constructed at the same time to provide a connection to the existing US 60 from the east for a logical construction terminal. With access

points to Superior west of Boyce Thompson Arboretum and near Top of the World, Alternative A-2 provides less desirable access to Superior than either Alternative A-3 or A-4.

Alternative A-3 provides the best access to Superior and is the least costly alternative. Conversely, it has the least desirable horizontal alignment and has profile grades in excess of 6 percent. The design speed is 55 mph, which is in ADOT's acceptable range for mountainous terrain. However, all of the new structures and improvements will be within lands owned and managed by the Resolution Copper Company. Further analysis with improved mapping and an understanding of potential settlement risks due to mining operations is necessary to determine if Alternatives A-3a and A-3b are feasible.

Major structures are required for both Alternatives A-3a and A-3b including tunnels, viaduct bridge structure, and retaining wall construction. Constructing the viaduct section in Alternative A-3a over the existing roadway and maintaining traffic seems to be impractical and would likely increase construction costs a substantial amount; however further study would be required to evaluate the cost impact. Constructing the widening section of the concrete median sections will be very difficult and will require some road closures for blasting and rock removal. Further study would also be required to evaluate the cost impact and the traffic impact of constructing Alternative A-3b under traffic. Both options in Queen Creek Canyon may be environmentally challenging with costly mitigation measures. Again, the uncertainties of future mining operations will also need to be considered, especially with respect to the new tunnels and viaducts.

Alternative A-4 also presents some environmental concerns due to the large cuts and fills that will be visible from Superior and US 60 west of Superior. The cost of the earthwork and tunnels make Alternative A-4 the by far the most expensive alternative through segment A. Access to Superior is better than Alternative A-2 with access points at the top of Queen Creek Canyon (MP 230) and west of Boyce Thompson Arboretum.

Conclusion: Alternatives A-2 and A-3b are recommended for further study.

- **Alternatives B-1, B-2, and B-3**

The Segment B alternatives are adjacent to the Top of the World residential area and associated private property. The terrain is still considered mountainous, however it is not as severe as Segment A. All of the alternatives are about the same length and none of them involve significant structures.

Alternative B-1 westbound traffic bypasses Top of the World north of existing US 60. A single westbound lane is carried through Top of the World to provide local access for westbound traffic. With eastbound traffic being carried on existing alignment, the westbound access lane creates a somewhat awkward and undesirable traffic configuration with one westbound lane and two eastbound lanes plus a continuous turning lane through the Top of the World area. East and west of Top of the World the access lane ends and US 60 would again be a 4-lane divided highway. The existing roadway would have to be widened to provide for the access lane and continuous left-turn lane.

Alternative B-2 would have minimal impact on traffic during construction. Alternative B-1 would have moderate impact on traffic during construction.

Alternative B-2 is the highest cost option in Segment B and requires significant right-of-way from private property, but has the best horizontal alignment and separates regional high-speed traffic from local traffic. It also moves the highway away from the residential improvements more than other alternatives. The existing roadway would be retained for local access and it could be turned back to the county.

Alternative B-3 utilizes the existing roadway alignment and requires the least amount of new right-of-way and is the least expensive alternative in Segment B. This alternative does not provide for a high-speed access controlled rural highway. All the regional traffic will go through the Top of the World residential area. Significant cut will be required for the new westbound lanes in Iron Canyon west of Top of the World.

Conclusion: Only Alternatives B-2 and B-3 are recommended for further study.

• Alternatives C-1 and C-2

Alternatives in Segment C traverse mountainous terrain surrounding Pinto Creek from the Top of the World area to Pinto Valley Road west of Miami.

Alternative C-1 utilizes the existing US 60 alignment for the future westbound traffic while a new roadway will be provided for eastbound traffic including a new bridge over Pinto Creek. The new roadway will provide a very good horizontal with a design speed of 60 mph, the westbound alignment will provide a design speed of 55 mph with only adequate alignment features. Alternative C-1 is less expensive than Alternative C-2.

The existing roadway will not be utilized in Segment C for Alternative C-2. It could be retained as a local access roadway and could be turned back to the county. Alternative C-2 will require two new bridges over Pinto Creek and is more expensive than Alternative C-1, but will provide a higher level of service and a design speed of 60 mph.

Conclusion: Alternatives C-1 and C-2 are recommended for further study.

• Alternatives E-1 and E-2

Segment E is essentially in two parts. The southern subsection is from the “Gap” to the US 70/SR 77 intersection, while the northern subsection is from the US 70/SR 77 intersection to the connection with US 60 northeast of Globe. Each subsection of Segment E will be compared separately.

Alternative E-1-South is slightly longer and has steeper grades than Alternative E-2-South. E-2-South has more cut at the beginning of the segment. Alternative E-1-South provides a better connection for eastbound traffic wanting to head south on SR 77 and for northbound SR 77 traffic desiring to go west on the new US 60. The amount of traffic predicted to make these movements is likely to be small. It is recommended that alternative E-1-South be eliminated since E-2-South is shorter and provides better vertical alignment.

In the DCR phase, Segment D can be extended to SR 77 to provide a logical terminus to that segment.

Alternative E-1-North requires less private property than Alternative E-2-North, however the grades exceed the ADOT recommended maximum grade of 4 percent for rural highways in rolling terrain. Alternative E-2-North does meet the recommended maximum grade requirements but requires more private property. A site for a Middle School has been proposed on State Land just west of Alternative E-1-North. It appears the proposed site will be outside the right-of-way corridor for Alternative E-1-North.

Conclusion: Alternatives E-1-North and E-2 (both north and south) are recommended for further study.

• Alternatives F-1, F-2, and F-3

It may not feasible to construct a four-lane divided highway north of Miami/Globe that meets geometric requirements as identified in ADOT Design Guidelines and included in Section 5 of this report. The constraints imposed by the natural terrain, in particular those immediately west of SR 188, are so severe that an acceptable route cannot be identified. However, if building a new roadway south of Miami/Globe on National Forest Land is eliminated due to environmental reasons, the costs for considering an alternative through this segment becomes reasonable.

In addition to the three alternatives identified, an additional alternative may be developed on the private lands that exist south of the forest boundary, north of US 60. This would require development of an alternative through the mines and private development, an objective discouraged initially from this Feasibility Study. However, if building an alignment across mine property is acceptable, this area is already disturbed and is topographically feasible.

The advantage to finding a route north of the Globe/Miami area is that travel to Roosevelt Lake, a key recreation destination from the metro Phoenix travelers, is reduced when compared to using Alternatives D and E. However, travelers to the lake can continue to use the old highway through Miami as this route into town from the beginning of Alternative D would be retained as the main entrance into town. For all other travelers, Alternatives D and E offer similar travel distances over significantly less aggressive terrain and through more pleasant visual landscapes.

For the purposes of the DCR environmental documentation, at least one alterative through the F Segment is necessary. We recommend that

Alternative F-1 be considered as developing through the mines and across developed private land at this time does not seem feasible when public lands are available.

Conclusions

Several alternative alignments have been developed and evaluated for improvement of US 60 between the Town of Superior and the City of Globe to enhance safety and traffic operational characteristics of the roadway and to meet current and future traffic needs. In addition to traffic and safety, several improvements were considered to enhance the roadway appearance while blending in with the adjacent landscape and potential development. The alternatives recommended for further study include the following:

Table 4-3: Alternatives to Carry Forward

Study Segment	Alternatives to Carry Forward into DCR
No Build	Consideration of No Build Scenario
A	A-2, A-3
B	B-2, B-3
C	C-1, C-2
D	D-1
E	E-1-North, E-2
F	F-1

Following acceptance of the roadway corridors presented in this report, a Design Concept Study should be conducted to determine a recommended roadway solution from the above listed alternatives, as well as developing an implementation plan.